centres and at school clinics all aim at this and are valuable aids towards its consummation.

The most serious item of loss of life is, and always has been, infant and child mortality. For the years 1911-1914, 575,078 children died under the age of five years in England and Wales. It is true that infant and child mortality has declined during the last few years, but, even so, we are losing 100,000 lives or more annually, a large proportion of which could undoubtedly be saved to stock the country in the future. A broad and comprehensive scheme of national health service would accomplish much, and this is a problem to which the best energies of the Government should be directed without delay.

There is reason to believe that the Bill dealing with health questions which it is the intention of Lord Rhondda, the President of the Local Government Board, to introduce, will provide for the creation of a Ministry of Health, in which the supervision of many of the public health and medical services of the country will be concentrated. At present the national health is dealt with by several Government Departments—it is stated, by as many as *fourteen!* Thus, the general public health is administered by the Local Government Board, the health of workers by the Home Office, the health of school children by the Board of Education, the health of ships by the Board of Trade; and the Board of Agriculture, the National Insurance Committee, and other Departments share in various ways. Such a multiplicity of authorities naturally leads to much overlapping, want of co-ordination, and waste.

The establishment of a Ministry of Health, with a Minister of Cabinet rank in charge of it, which would bring under its ægis the whole of the health service and administration of the country, would be a measure of the highest importance at the present time. Wisely conceived and wisely administered, such a Ministry would be welcomed by the medical profession and by health workers generally, the public would gain by increased efficiency and diminished waste, and the national health would be placed on a surer foundation of control than is at present the case.

NOTES.

We are informed that the South-Eastern Union of Scientific Societies will hold its twenty-second annual congress in the rooms of the Linnean Society, Burlington House, from Wednesday, June 6, to Saturday, June 9, under the presidency of Dr. W. Martin. Arrangements will be facilitated if those proposing to join the congress will communicate with the hon. treasurer, Mr. R. Adkin, 4 Lingards Road, Lewisham, S.E. The Wednesday evening will be devoted to the president's address, and on the Thursday evening the attendance of the congress at the "Hooker lecture" by Prof. F. O. Bower will be invited by the Linnean Society. The union may be congratulated on maintaining its accustomed course at a time when the claims of science are being brought prominently before the public mind.

We learn from *Science* that the Academy of Natural Sciences of Philadelphia has, on the recommendation of the council and the special committee on the award, voted the gold Hayden memorial geological medal to Prof. W. M. Davis, emeritus professor of geology in Harvard University, in recognition of his distinguished work in the science of geology. The medal, says *Science,* is awarded every third year "for the best publication, exploration, discovery, or research in the sciences of geology and palæontology, or in such particular branches thereof as may be designated." The award as first defined in 1888 took the form of an annual bronze medal and the balance of the income of the fund. The deed of gift was modified in 1900 so as to provide for a gold medal every third year.

Dr. J. O. Hesse, director of the Associated Quinine Factories of Zimmer and Co., died at Feuerbach, near Stuttgart, on February 10, in his eighty-second year. Dr. Hesse devoted almost the whole of his scientific career to the extraction and examination of the active constituents of drugs, particularly of cinchona bark, coca leaves, and opium, and was for many years the leading authority on the chemistry of quinine and other cinchona alkaloids. He isolated physostigmine from Calabar beans, cotoin, paracotoin, and other principles from coto and paracoto barks, ditaine from dita bark, and also the active principles from a number of other drugs. Many of his researches were published in the Journal of the Pharmaceutical Society, of which he was elected honorary member in 1879. The value of his original investigations gained for him in 1891 the Hanbury gold medal, the highest honour that the Pharmaceutical Society can bestow.

The death is announced of Mr. Arthur Brooker, joint-author of Slingo and Brooker's "Electrical Engineering" and of other works. From the *Electrician* we learn that Mr. Brooker joined the telegraph department of the Post Office Service in 1878. In 1889 he became an instructor in the Telegraphists' School of Science in mathematics and laboratory practice, and the following year he was made chief instructor. He was also on the staff of the People's Palace and the Currie School of Engineering as instructor in electrical engineering. His scientific attainments procured for him rapid promotion in the Post Office Service. He was largely responsible for the development of the present testing branch. It was his association in the production of Slingo and Brooker's "Electrical Engineering" in 1890 which brought his name before the public. After the publication of the book the authors entered into journalism, and contributed largely to the pages of the *Electrical Review.* In 1898 Brooker severed his connection with the Post Office, and became works manager of the Peel works of the General Electric Co., where he spent seven years in organising the factory and devoting himself to the manufacture of telegraph and telephone apparatus. In 1906 he joined the British Insulated and Helsby Cables, Ltd., and on the formation of the Automatic Telephone Manufacturing Co. in 1912 he became its general manager, a position he retained until shortly before his death.

The March number of the *Scientific Monthly* contains a series of articles by well-known American authorities on the question of the metric system of weights and measures. During the last sixteen years the movement for the compulsory adoption of the metric system in the United States has made considerable progress, thanks, in great measure, to the stimulus given by the Bureau of Standards at Washington. The enormous quantity of war material at present being manufactured to metric sizes in America is rendering the workmen as familiar with grams and centimetres as they are with the pound and foot. It is felt in many quarters that the present time affords an unusual opportunity for making metric weights and measures the official system of the United States. The allegation of the opponents of the system that its general introduction would render obsolete and useless large quantities of machinery and machine tools is being vigorously combated, and it is being made clear to manufacturers that no ordinary machines, such as lathes, drills, shapers, etc., would have to be changed. The same tools would continue to make the same things, but the numerical values of the sizes made would be altered. Much attention has been given to the question whether the expense and inconvenience necessarily incident to the exclusive use of the new system would be too costly, and it is generally conceded that these would be far outweighed by the national and international advantages accruing from the change. It is not proposed that a sudden transition from one system to the other should be sanctioned by Congress, but that ample time for preparation should be allowed. In this way price lists, catalogues, and sizes could be tabulated in advance in both systems, side by side, so that the old numerical values could gradually be dropped.

At the end of July last year, at the instance of the Advisory Council of the Committee of the Privy Council for Scientific and Industrial Research, a meeting of representatives of some of the larger firms engaged in the various branches of the cotton trade and others interested in textile research was called by the Lord Mayor of Manchester to consider the possibility of establishing a scheme for the scientific investigation of the various problems presented by the cotton-using industries, and it was agreed that there is great need for research bearing on the cultivation and manufacture of cotton, and in the dyeing, printing, bleaching, and other finishing processes. It was also thought that efforts should be made to increase and to improve the system of textile education. A provisional committee was afterwards appointed, and this, in due course, was constituted a committee of the Advisory Council of the recently formed Government Department of Scientific and Industrial Research. This committee is largely representative of the various interests concerned. Its function is to formulate a preliminary scheme of a comprehensive character and to report to the Advisory Council, and then to lay before the trade, for its consideration, definite proposals for the establishment of a research association, eligible for recognition by the Government Department, and consequently for monetary grants from the National Exchequer. The committee has to consider the place for research in each branch of the cotton industry, whether in the cultivation of cotton, in spinning, doubling, manufacturing, knitting, lacemaking, bleaching, dyeing, printing, finishing, or in the technology of cellulose. It has also to ascertain what facilities now exist for the education of boys entering any of these branches, and what opportunities are likely to be offered by the trade for the employment of highly trained men. It will also formulate a scheme both for an institute to undertake research work in collaboration, so far as practicable, with existing bodies and for an association of firms and individuals willing to make donations and subscribe regularly for a period of years to promote research and improve technical training Any suggestions relating to the researches to be undertaken, or to any other matters coming within the scope of the proposed association, will be welcomed by the committee, and should be sent to the secretary, Provisional Committee on Cotton Research, 108 Deansgate, Manchester.

In the *Archives of Radiology and Electrotherapy* for March (No. 200) Mr. Hector Colwell gives a second instalment on the history of electrotherapy, in which the contributions of Priestley, Jallabert, Galvani, Volta, Aldini, Duchenne, and Marat are described. It is of interest that Marat, the French revolutionary, was a practitioner of electrotherapy. Articles on methods of jaw radiography and on abscess in bone are also included in this interesting number.

A second report upon investigations in the United Kingdom of dysentery cases received from the eastern Mediterranean has been issued by the Medical Research Committee. In this report (No. 2) Drs. Rajchman and Western discuss the findings in 878 cases of bacillary enteritis. Serological evidence of bacillary dysentery was obtained in 34·7 per cent. of the cases examined, of paratyphoid infection in 18·3 per cent., of mixed dysenteric and paratyphoid infections in 10·1 per cent., and of pure amœbic infection in 6·2 per cent. In every case of mixed bacterial infection, dysentery bacilli were the originally infecting virus, and a considerable number of purely bacillary cases of dysentery were detected. While not wishing to minimise in any way the amœbic factor, Drs. Rajchman and Western hold that the Mediterranean infection was essentially a mixed one.

The Journal of the South African Ornithologists' Union for December, 1916, has just reached us. In his observations on the birds of the district of Humansdorp, Cape Province, Mr. B. A. Masterman remarks that Kolb's vulture "has entirely disappeared from that area, not one having been recorded for the last fifteen years," where formerly it used to breed regularly. According to the farmers, this bird was exterminated from having feasted on the flesh of cattle which died of rinderpest during the great outbreak of that disease. The late Capt. Selous, it may be remembered, commented on the absence of vultures of this species from the battlefields in Rhodesia during the Matabele campaign, and attributed it to the same cause. In the same issue the Rev. R. Godfrey has some interesting notes on the summer migration of 1915–16 as observed in the eastern districts of the Cape Province.

A most admirable "Guide to the British Freshwater Fishes," by Mr. C. T. Regan, has just been issued by the trustees of the British Museum of Natural History. In the case of each species described the author gives its distribution not only in our home waters, but also outside the area of these islands. An added interest and value are given to his pages in that, as occasion offers, he provides evidence, from the distribution of our fish fauna of to-day, of a remote connection between our river systems and those of the Continent. His account of the Salmonidæ and of the various hybrid forms which occur so frequently among the Cyprinidæ will be especially welcome. An immense amount of information has been crowded into a very small space, yet nowhere has the reader cause to complain of a lack of interest or lucidity. Finally, the book is most profusely illustrated.

The science of economic aviculture has probably reached a higher standard in the United States than in any other part of the world. This work is carried on by the Department of Agriculture, which, for years past, has spared no pains to enact laws and formulate schemes for the conservation of bird-life, whether for purely economic ends or for æsthetic reasons. As a consequence, it has now available a mass of evidence as to the status and value of every species within its realms. The latest evidence of its enlightened policy takes the form of a bulletin—No. 465—on the propagation of wild-duck foods. The haunts and food values of no fewer than nineteen groups of plants, comprising sixty species, are here described, together with instructions as to stocking water in need of bait for these valuable birds. The characteristics of wild rice, wild celery, pondweeds, arrow-heads, chufa, wild millet, and water-lilies are all carefully set forth, and this information is accompanied by carefully collected data as to their attractiveness in regard to particular species of wild ducks. Had we followed its lead years ago our own Board of Agriculture would now be able to speak with authority when called on to sift the value of the crudely formed opinions of local agricultural chambers as to the usefulness or otherwise of our native birds in relation to our food supply. The matter is of vital importance, and the clamour for legislation is sometimes insistent. This war has done much for us already; perhaps it may yet bring into being a bureau of ornithology, such as is to be found now in many Continental States, as well as in America.

The new series of the *Agricultural Journal of India* which is inaugurated with vol. xii., part i. (January, 1917), contains several new features which should add to its value and interest. Selected short articles on a variety of subjects are included for the general reader, in addition to the original articles, which still remain the chief feature. A list of new books is also now added. Of the original articles a communication by Mr. and Mrs. Howard on leguminous crops in desert agriculture is of special interest.

Bulletin No. 65 of the Agricultural Research Institute, Pusa, contains an account by J. N. Sen of experiments on the assimilation of nutrient materials by the rice plant at various stages of growth. Determinations were made of the nitrogen, phosphoric acid, and potash in the roots, stems, leaves, and ears of samples of a uniform crop taken at six successive stages of growth. The results form an interesting series, and lead to general conclusions which are in close accord with those obtained elsewhere with rice and other cereals grown under widely different conditions. It is of interest to note that no evidence was obtained of any return of phosphoric acid and potash to the soil, such as has been deduced from earlier German experiments.

In Egyptian agriculture a very important *rôle* is played by the *berseem* crop (*Trifolium alexandrinum*), which covers nearly one-third of the cultivated area of Lower Egypt. The success with which it is grown in the low salt country in the extreme north of Egypt has suggested its use in similar country in India, and experiments have been in progress there on the Sukker and Mirpur Khas Government farms during the past ten years. A summary of the more recent results is given by G. S. Henderson in Bulletin No. 66 of the Agricultural Research Institute, Pusa. The results are uniformly favourable, and it would appear that the special merits of this crop as a cold-weather leguminous fodder crop that will grow in an alkali soil are likely to make it of the greatest value for wide tracts of land in the Government of Bombay and elsewhere in India.

The Bulletin (No. 193) on calf-feeding experiments issued by Messrs. O. F. Hunziker and R. E. Caldwell, of the Purdue University Agricultural Experiment Station, is essentially technical in character, but contains a feature of general interest in the excellent methods adopted for securing photographic records of the progress in growth of the animals. In each case the animal was photographed on a narrow raised platform with a background divided into six-inch squares. A black or white background was used according to the colour of the calf. Difficulties might be expected in inducing the animals to take up a satisfactory position with relation to the background, but the photographs with which the bulletin is profusely illustrated indicate that these difficulties have been satisfactorily overcome, and the results certainly furnish the feeder with a much better index in regard to the condition of the animal than tabulated figures alone could give.

The Geological Survey of Scotland, in the development of its national work, has published the first of a series of memoirs on "The Economic Geology of the Central Coalfield of Scotland" (1916, price 4*s.* 6*d.*). The district dealt with extends from Glasgow eastward to Salsburgh and Black Loch. The importance of marine zones as indicating horizons is pointed out, and maps are inserted showing by lines ("isopachytes") the thicknesses of selected seams in different parts of the areas which they underlie.

A new contribution to the problem of the clouds of vapour emitted by volcanoes is made by Mr. F. A. Perret in a paper on the eruption of Stromboli in 1915 (*Amer. Journ. Science,* vol. xlii., p. 462, 1916). The author observed that, without change in the conditions of eruption, a cloud was absent from the crater on a fine day, accompanied by a dry state of the air, but was copiously present when a chill moist wind supervened. A great cloud of vapour may thus be merely a condensation from the air on nuclei sent upwards by the volcano, and affords no indication of the condition of activity.

The Geological Survey of New South Wales has published (1916) a "Bibliography of Australian Mineralogy," by Dr. C. Anderson, arranged under authors, States, and localities within each State. To find the reference to dundasite, for example, it is necessary to remember that it comes from Tasmania, or to look for it under each separate State. The completeness of the work is evidenced by the inclusion of Dr. Prior's paper, in which he compares this mineral with specimens from North Wales. Considerable selection, however, must have been exercised in dealing with references to Australian gold.

Prof. Filippo Eredia, of the Italian Meteorological Service, has recently issued a manual of instruction in the use of meteorological instruments and for the taking of meteorological observations. The work in general get-up somewhat resembles the "Observer's Handbook" of our own Meteorological Office. A feature is the large number of illustrations, which are unusually clear and sharp. This manual of instructions has been brought out to normalise the work carried on at the widely spread network of stations in Italy and her colonies. We are surprised to find on Fig. 24 a representation of Six's thermometer, the defects of which are well known. Prof. Eredia has also sent an interesting pamphlet on the "Climate of Ghadâmes," an oasis in the interior of Tripoli, 500 km. to the south of Tripoli, at a height of 340 m. above the sea. Ghadâmes is in lat. 30° 8′ N., long. 7° 10′ W. The series of observations discussed comprise two sets, the first taken from the middle of August to December, 1861, while the second embraces the period June, 1913, to October, 1914. Dealing with the later series, the mean temperature, brought to a true average by comparison with Tripoli, is 23° C., the warmest month being August, with a mean of 33·8°, and the coldest January, with a mean of 11·1°. As compared with Tripoli, June is 9·2° warmer and December 2·6° colder. In the period under notice measurable rain fell on only five days, to the amount of 20 mm., and on fifteen others a few drops fell. The maximum fall noted was 8 mm. on February 14, 1914, with a N.W. wind. The cases of precipitation noted occurred principally with winds from the north-west and south-east. Winds are fairly evenly distributed round the compass, there being no marked excess from any one direction. In the year there were 251 cloudless and only twelve overcast days, the latter confined to the months November to March.

The theory of the immobility of the ether is advanced by Prof. P Zeeman in a short article in *Scientia* for February (pp. 122–29). In addition to referring to the experiments of Fizeau and of Michelson and Morley, the author mentions a recent redetermination which he undertook in 1916, using monochromatic light. The results fully confirm Fresnel's formula, as completed with Lorentz's term, and the hypothesis of an immobile ether is in entire accord with the observed effects.

In contributing a paper on "Impact in Three Dimensions" to the Proceedings of the Royal Irish Academy (xxxiii., Section A, No. 6), Prof. M. W. J. Fry has developed a subject on which a great deal evidently remained to be said over and above what is contained in Routh's "Rigid Dynamics." Some of the results are almost at variance with preconceived ideas on the subject. For example, while the velocity of compression can only vanish once in the two-dimensional problem, it may vanish three times in an impact in three-dimensional motion.

An interesting note on the colouring matter of red torulæ, by Mr. A. C. Chapman, appears in the *Biochemical Journal* for December, 1916. Study of this colouring matter showed that it resembles carrotene in being practically insoluble in water, in dissolving to a blue solution in concentrated sulphuric acid, and in the fact that its chloroform solution, when warmed and exposed to the light, quickly becomes colourless. But comparison of the absorption spectrum of the torulæ colouring matter with that of carrotene showed that the two are by no means identical.

The Journal of the Franklin Institute for March contains the address delivered before the institute in October last by Prof. L. V. King, of McGill University, on the acoustic efficiency of fog-signal machinery. After a review of the work on fog signalling done by the committee of the Trinity House in this country and by the lighthouse boards of the United States and of France, he describes his own measurements made in 1913 in connection with the fog-signal plant at Father Point, Quebec. The sound-producer there is a compressed-air siren of the Northey type using air at 25 lb. per square inch and giving a note of frequency 180 per second. During the actual emission of the sound 100 horse power is used. By measurement of the temperature of the issuing air when sound was produced and when not, it was found that only about 2·4 horse power was converted into sound. Tests of the intensity of the sound received at points on the water up to eight miles from the source were made by means of the sound-meter of Prof. A. G. Webster, of Clarke University, which depends on the motion of a small mirror mounted on a mica diaphragm at one end of a resonator. Zones of silence were found, on both sides of which the sound was distinctly heard. The existence of these zones appears to be intimately connected with the direction of the wind and to a less extent with the weather.

Prof. Martin Knudsen has recently described some interesting experiments on the condensation of metallic vapours on cold bodies (*Oversigt Kgl. Danske Vidensk. Selsk. Forh.*, 1916, No. 4, p. 303). When mercury vapour passes through a narrow opening into a large glass bulb containing a concentric smaller bulb tube with liquid air, most of the mercury vapour is condensed on the front of the smaller bulb facing the opening; a little passes alongside it on to the inner surface of the larger bulb, but no mercury is condensed on the back of the smaller bulb nor behind it on the larger one. The bulb with liquid air casts, as it were, a shadow, and retains all the molecules striking it. If, on the other hand, the inner bulb is only cooled with ether and carbon dioxide, the greater portion of the mercury vapour is not retained by it, and is condensed on the front half of the larger bulb. From the weight of mercury so condensed on the latter in an interval of time during which the inner bulb has only acquired a deposit thinner than the (known) limit of visibility, it is calculated that the chance of a mercury molecule being retained at its first impact on a glass surface at −77·5° is less than 1 in 5000. Between this temperature and that of liquid air there is a critical temperature in the neighbourhood of −140° to −130°. Preliminary experiments with a simpler apparatus indicate that for zinc, cadmium, and magnesium this critical temperature lies between −183° and −78°, for copper between 350° and 575°, and for silver above 575°.

Although the principles that render colour kinematography possible are so simple, there appears to be an inexhaustible field for inventors in the applications of these principles, and not infrequently the details of "new" processes appear to the student of science as disadvantageous complications, if not actual infringements, of the necessary conditions. However, processes stand or fall by their results, and the *Scientific American* of March 10 states that the last "new process," as demonstrated at the American Museum of Natural History and the New York Academy of Sciences, seems to be "perfection." The simple attachments necessary can be fitted to any apparatus. A single film is used, and the pictures are taken behind a revolving four-sector colour filter, arranged with two pairs of complementary colours—namely, blue and orange, and blue-green and red. The complete element consists, therefore, of four consecutive pictures taken through colour filters in the order just named. The colour filter for projection has only two colours, red and blue, and has therefore to rotate at twice the rate of the filter disc used for taking the photographs. But each colour filter in the projector disc is subdivided into three sectors in such a way that each red and orange picture is projected through a red filter increasing in intensity in three stages, and each blue and blue-green picture in a similar way through three blue filters. The usual rate of projection is sixteen pictures per second, and Mr. G. A. Smith, in his "Kinemacolor," introduced in 1907, who used two consecutive colour pictures, found it necessary, as seems natural, to double this rate so as to maintain the same rate for each complete element. In the present case, with a quadruple element, one might expect the rate to be increased to four times—namely, sixty-four per second—but the actual rate stated is twenty-four—that is, only six complete elements per second.